

functional abilities as measured by the BI, the physical function subscale of the 36-item Short Form Health Survey (SF-36)([109](#), [110](#), [112](#)), and upper extremity motor function.([107](#), [109](#))

The current systematic evidence review identified two SRs that include 46 studies (n=1,900). ([113](#), [114](#)) Monte-Silva et al. (2019) concluded that electromyogram-triggered/controlled neuromuscular electrical stimulation (EMG-NMES) was effective in improving upper limb motor impairment.([114](#)) Kristensen et al. (2022) found benefits of NMES for improvement in ADL function but less clear evidence for improvement in functional motor ability.([113](#)) The studies had variable stimulation protocols in pulse, duration, frequency, and so forth.

The SR/MA by Monte-Silva et al. (2019) (n=782) found that EMG-NMES as an adjunct to conventional care, compared with conventional care alone, had a statistically significant effect at the end of treatment on the International Classification of Functioning, Disability, and Health body structure and function domain, as measured by Fugl-Meyer Assessment - Upper Extremity (FMA-UE), reaction time, force, and range of motion (SMD: 0.47; 95% CI: 0.21–0.72; p<0.001).(114) However, no significant effect was noted in the ICF Activity and Participation domains (Functional Independence Measure, mBI, MAL-AOU, and others). Treatment dose varied from 2–20 weeks duration, 6–168 hours of intervention, delivered one to three times per day, one to seven times per week. Only eight of the studies in this SR (approximately 1/4 of the subjects) reported long-term follow-up in any ICF domain, ranging from 5 weeks to one year. There were no differences between groups in any domain at follow-up. This SR included trials where the patient had to produce EMG activity in the affected muscle to receive the stimulation; contralaterally controlled electrical stimulation trials were excluded.

An SR/MA by Kristensen et al. (2022) (n=1,100) found that NMES, compared with control (sham NMES or no intervention), had a statistically significant effect on ADLs as measured by the BI, mBI, and Functional Independence Measure (FIM) (SMD: 0.41; 95% CI: 0.14–0.67; p=0.003).(113) Subgroup analysis revealed that this effect was primarily driven by studies of upper extremity NMES (SMD: 0.34; 95% CI: 0.04–0.64; p=0.02). No improvement in functional motor ability was noted overall. However, subgroup analyses revealed a statistically significant positive effect on functional motor ability as measured by the ARAT in patients with severe paresis (SMD: 0.41; 95% CI: 0.12–0.70; p=0.005). This SR considered only NMES studies with surface electrode delivery and documented visible muscle contraction.

The findings from the 2019 VA/DoD Stroke Rehabilitation CPG and the current systematic evidence review reveal that short-term improvement might occur in upper extremity motor outcomes/ADLs and lower extremity motor outcomes, but insufficient evidence exists to determine whether this improvement is sustainable.